Planting Date Effects on Spring Oilseed Production

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Summary

Mid-March plantings generally resulted in best emergence for *Brassica napus* and *B. juncea*. Best emergence for *Camelina sativa* corresponded with mid-February to mid-March planting dates. Days from emergence to 50% bloom generally decreased with later planting and emergence dates; 50% bloom generally occurred in late May to early June. Greatest yields for *B. napus*, *B. juncea*, and *C. sativa* corresponded with the mid-March planting date in 2005, the only growing season with favorable yield formation. Mid-March appears to be a desirable planting period for these spring oilseed crops.

Introduction

Spring oilseed crops such as canola (*B. napus*) offer diversity to grain-based cropping systems. Improved adaptability of dryland mustard and canola oilseed crops on the High Plains of the west central United States can lead to commercially viable cultivation that yields feedstocks for oilseed markets. Spring oilseed crops can be planted from mid-February through April and flower in late May for a mid-July harvest. Available water, stand establishment, and heat avoidance are significant factors affecting spring oilseed yields in the central High Plains. Developing baseline data for oilseed cultivars can help growers in this region evaluate the commercial feasibility of spring oilseed production.

The objective of this study was to determine the effects of planting date on emergence, days to bloom, and oilseed yield.

Procedures

Seed from three cool-season oilseed species—*B. napus* 'Hyola 401', *B. juncea* 'Arid', and *C. sativa* 'Boa'—were direct seeded in replicated plots of 150 sq. ft. Seed was drilled into weed-free wheat stubble in 2004, into terminated wheat stubble in 2005, and on fallowed land in 2006. In 2004, each species was tested with and without a polymer seed coating (Extender; Grow Tec Seed Coatings, Inc., Boston, MA). In 2005 and 2006, *B. juncea* was tested with and without the polymer seed coating. There were five planting dates each year from late winter to early spring, each with seed drop equivalent to 800,000 seeds/a. Supplemental nutrients were applied: 80-30-0 in 2004, 60-30-0 in 2005, and 90-30-0 in 2006. The insecticide Capture (1.3 oz/a) was applied twice, 2 weeks apart, for flea beetle control. In 2004 and 2005, the herbicide Select (5 oz/a) was applied with crop oil to control volunteer wheat and grassy weeds. In 2005, a total of 2.1 in. of irrigation was applied. Field observations included emergence and stand ratings, 50% bloom date, and maturity date. Seed was harvested and analyzed for water content, test weight, and yield.

Results

The best emergence ratings for *B. napus* and *B. juncea* corresponded with mid-March planting dates, but mid-February through mid-March planting dates resulted in best emergence for *C. sativa* (Figures 1, 2, and 3). Days to stand establishment and days to 50% bloom tended to decrease with later planting dates (Tables 1, 2, and 3), which likely reflects seasonal warming effects on emergence and development as well as photoperiod effects on floral development. Generally, emergence ratings were greatest for *B. napus* (4.5), poorest for *C. sativa* (3.5), and intermediate for *B. juncea*. Polymer coating did not significantly alter emergence rating, days to 50% bloom, or oilseed yield for the *B. juncea* line.

Bloom dates are related to maximum emergence dates to minimize effects of delayed emergence on floral development. Generally, 50% bloom occurred 25 to 50 days after maximum emergence (Figure 3); fewer days to bloom were required with later emergence dates. This relationship between emergence date and days to 50% bloom resulted in late-May to early June flowering for these spring oilseed crops.

Growing conditions resulted in favorable yields in 2005 (Figure 4) but not in 2004 (Figure 5) or 2006. In 2005, *B. napus* yields were greatest for mid- to late-March plantings, which corresponded to emergence in mid-April and 50% bloom in late May; however, there was no significant difference in yield among February 18, March 14, and March 28 plantings. Greatest yields for *B. juncea* and *C. sativa* also corresponded with mid-March plantings. *C. sativa* planted in mid-April achieved 80% of maximum yield that resulted from the mid-March planting. Hand-harvested samples from *C. sativa* plots had 60% greater yields than machine-harvested samples, indicating increased yield potential, which could result from improved stand establishment.

Table 1. Effect of planting date on emergence, time required for flowering and maturity, and oilseed yield for spring *Brassica napus*, *Brassica juncea*, and *Camelina sativa*, Colby, KS, 2004

Effect	Emergence rating		50% bloom	Yield
	Rating[1]	DAP[2]	DAE[3]	lb/a at 8%
Dec. 3, 2003	2.5	96	45	140.6
Jan. 13, 2004	2.6	100	42	119.0
Feb. 16, 2004	3.7	101	38	87.0
Mar. 18, 2004	3.4	107	39	90.1
Apr. 13, 2004	3.3	120	---	83.3
B. napus	3.6	105	37	51.6
B. juncea	2.8	104	39	22.1
C. sativa	2.9	106	---	238.3

[1] Maximum emergence rating, 1 = poorest, 5 = best.
[2] Days after planting.
[3] Days after maximum emergence rating.

Table 2. Effect of planting date on emergence, time required for flowering and maturity, and oilseed yield for spring *Brassica napus*, *Brassica juncea*, and *Camelina sativa*, Colby, KS, 2005

Effect	Emergence rating		50% bloom	Yield
	Rating[1]	DAP[2]	DAE[3]	lb/a at 8%
Feb. 18, 2005	2.6	44	49	755
Mar. 14, 2005	3.9	34	33	1,251
Mar. 28, 2005	2.1	20	45	775
Apr. 4, 2005	3.4	11	41	811
Apr. 25, 2005	2.4	14	33	444
B. napus	3.6	25	37	1,235
B. juncea	2.7	24	42	696
C. sativa	2.4	25	41	622

[1] Maximum emergence rating, 1 = poorest, 5 = best.
[2] Days after planting.
[3] Days after maximum emergence rating.

Table 3. Effect of planting date on emergence, time required for flowering and maturity, and oilseed yield for spring *Brassica napus*, *Brassica juncea*, and *Camelina sativa*, Colby, KS, 2006

Effect	Emergence rating		50% bloom	Yield
	Rating[1]	DAP[2]	DAE[3]	lb/a at 8%
Feb. 28, 2006	1.9	57	40	13
Mar. 30, 2006	3.2	38	29	11
Apr. 3, 2006	2.4	30	32	18
Apr. 17, 2006	2.4	26	34	11
May 1, 2006	3.5	36	14	2
May 16, 2006	2.1	24	---	1
B. napus	3.9	37	26	15
B. juncea	3.1	35	29	8
B. juncea treated	1.6	37	34	2
C. sativa	1.8	32	34	12

[1] Maximum emergence rating, 1 = poorest, 5 = best.
[2] Days after planting.
[3] Days after maximum emergence rating.

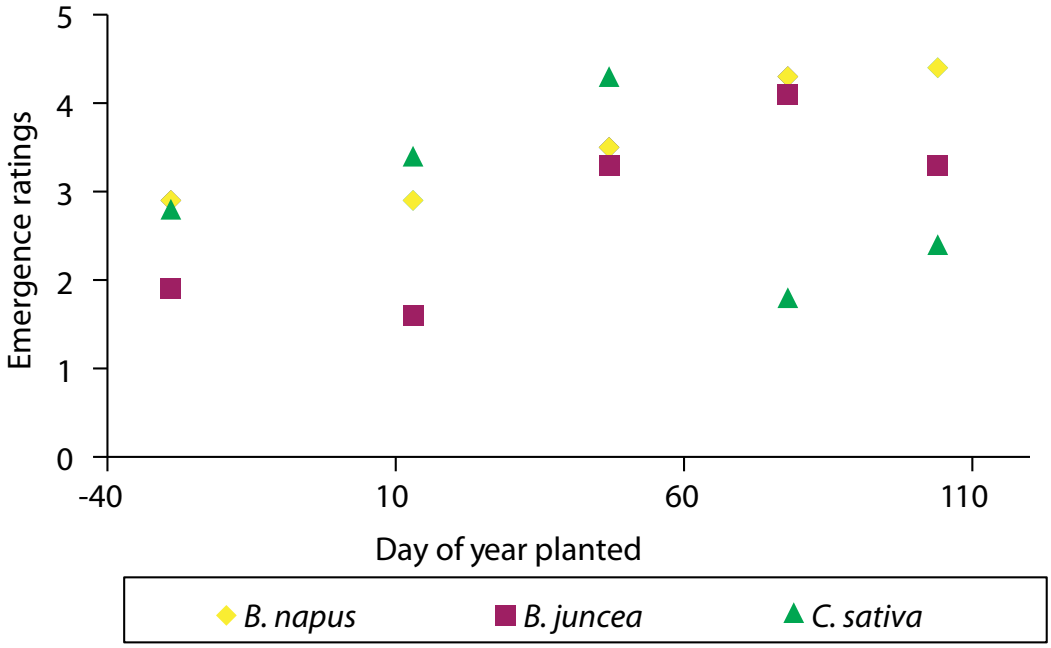

Figure 1. Emergence ratings (Apr. 25, 2004) for *Brassica napus* 'Hyola 401', *Brassica juncea* 'Arid', and *Camelina sativa* 'Boa' shown in relation to planting dates (Dec. 15, 2003 through Apr. 13, 2004) in Colby, KS.
Dec. 3, 2003, planting date is indicated as a negative day of year.

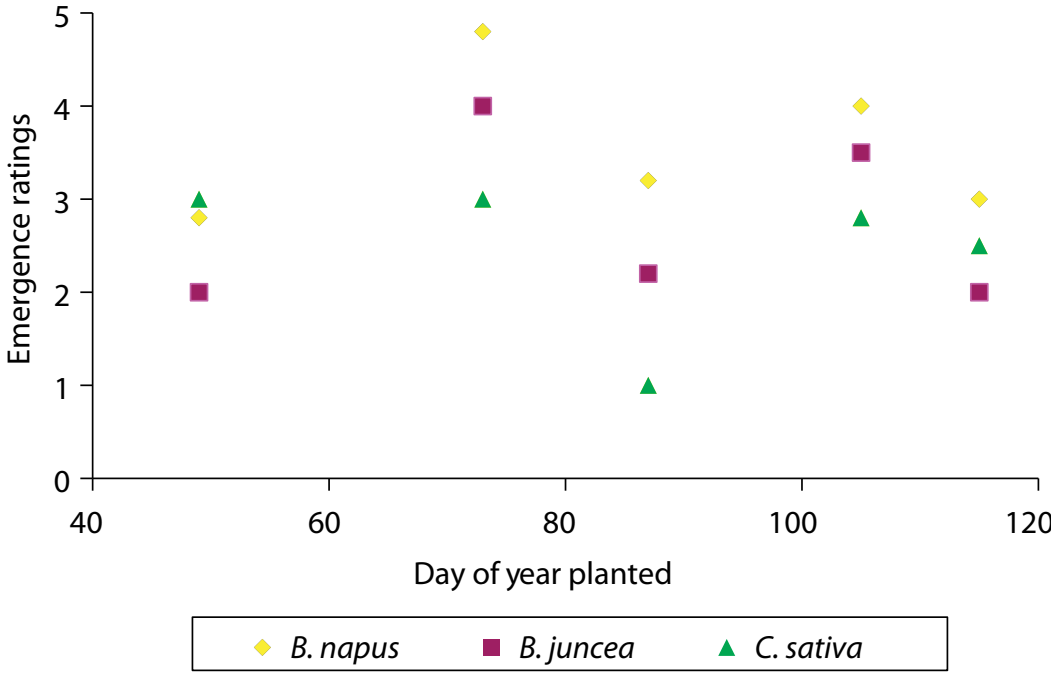

Figure 2. Maximum emergence ratings for *Brassica napus* 'Hyola 401', *Brassica juncea* 'Arid', and *Camelina sativa* 'Boa' shown in relation to planting dates (Feb. 18, 2005 through Apr. 25, 2005) in Colby, KS.

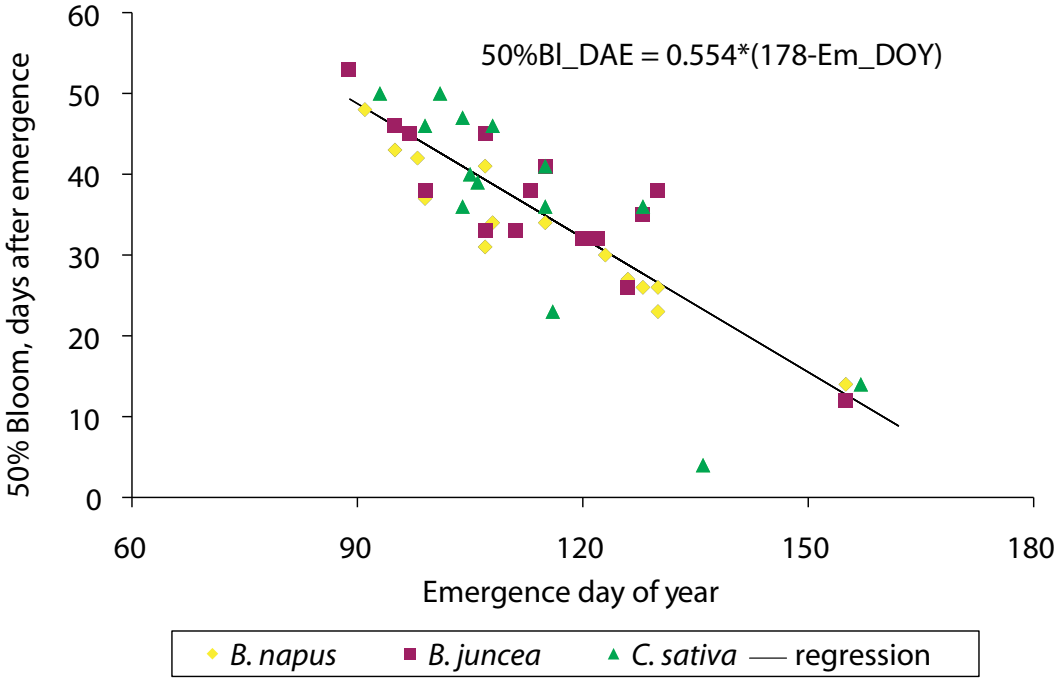

Figure 3. Days from time of maximum emergence required to reach 50% bloom for *Brassica napus* 'Hyola 401', *Brassica juncea* 'Arid', and *Camelina Sativa* 'Boa' grown in 2004, 2005, and 2006 in Colby, KS.

The regression equation ($R^2 = 0.72$) shows that bloom date (50% Bl_DAE, days after maximum emergence) can be calculated from date of maximum emergence (Em_DOY, day of year).

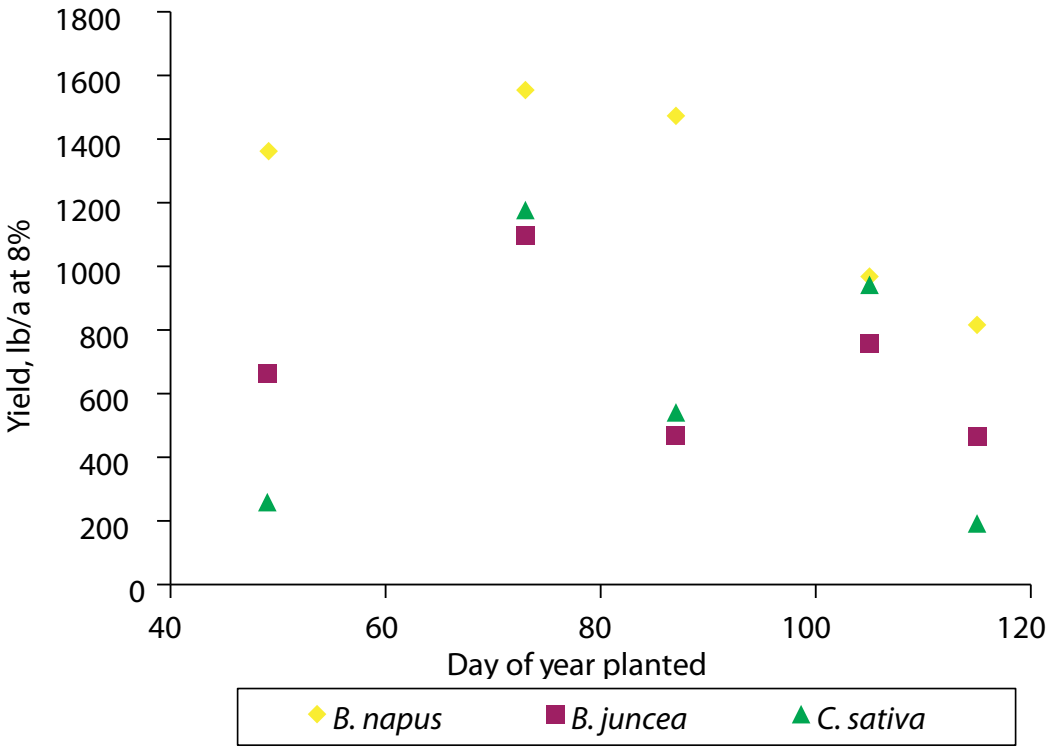

Figure 4. Seed yields (adjusted to 8% moisture content) for *Brassica napus* 'Hyola 401', *Brassica juncea* 'Arid', and *Camelina sativa* 'Boa' shown in relation to planting dates (Feb. 18, 2005 through Apr. 25, 2005) in Colby, KS.

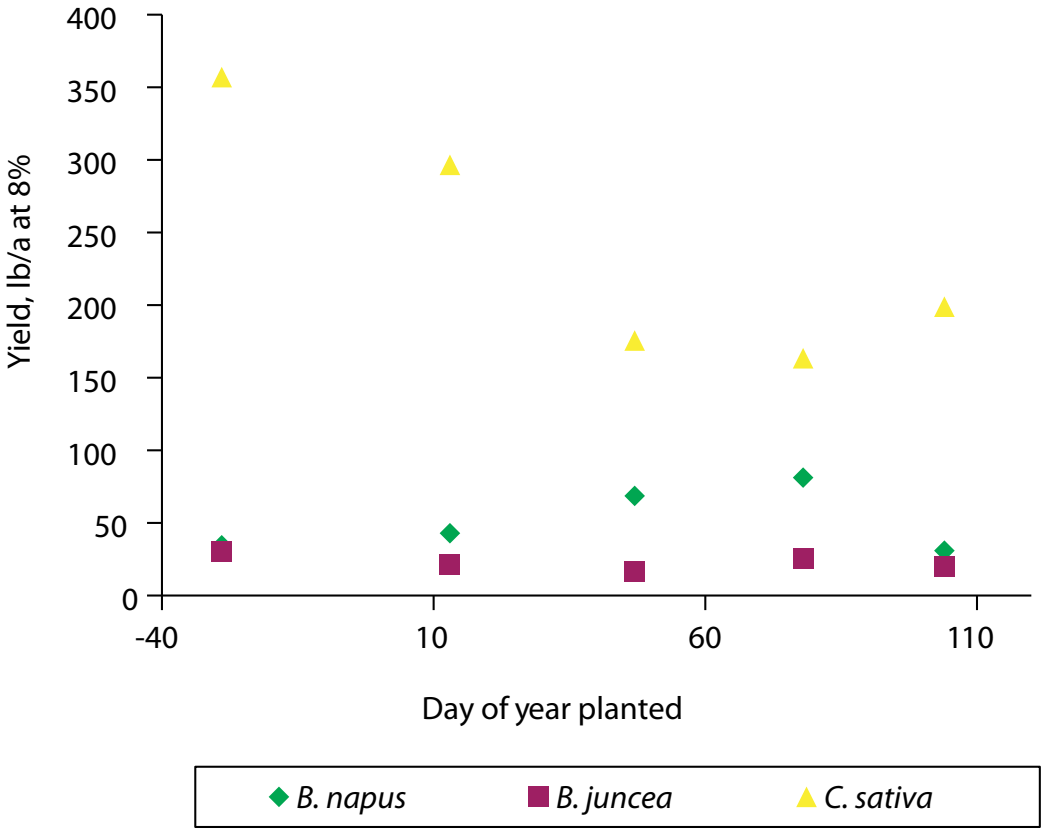

Figure 5. Seed yields (adjusted to 8% moisture content) for *Brassica napus* 'Hyola 401', *Brassica juncea* 'Arid', and *Camelina sativa* 'Boa' shown in relation to planting dates (Dec. 15, 2003 through Apr. 13, 2004) in Colby, KS.